

FALL? 98  
SPRNG.

## STEAM GENERATOR INSPECTION - BURNERS

### OBSERVATIONS AND WORK ACCOMPLISHED

Babcock and Wilcox (B&W) had contractual work responsibilities to continue to resolve problems experienced with the operation and maintenance of the burners (48 total per unit) and their related equipment. IPSC Technical Services monitored the modifications made to the burners, inspected to document ongoing status and tested after the outage to ensure adequate burner operation, flame stability and register mobility. Outage activities completed by B&W and observations made on the burners are as follows:

**OUTER REGISTERS** - The outer register vanes were trimmed in a trapezoidal shape to prevent bidding and freezing due to thermal expansion or "oil canning" against the outer register assembly support plates. Trimming was done on all burners which included both the original and HD upgrade outer registers. The front side of the vane (closest to the water walls) was trimmed 3/4 inches on the end tapered back eight (8) inches. The back side (closest to the windbox) was trimmed (initially notched during the fall, 1987, outage) to 1 3/4 inches on the end and tapered back eight (8) inches toward and hub.

**LIGHTER SHROUDS** - Two missing outer thermal shrouds which go around the lighters for radiation protection were replaced due to poor attachment to the inner sleeve of the burner which resulted in attachment failure and the shrouds falling out. All other shrouds were reattached to prevent loss or drooping by welding a bar stock support bracket under the shroud. These modifications were made from the furnace side of the boiler via skyclimber.

**SPIN VANE REGISTERS** - Spin vane drive gear assemblies were observed showing flyash accumulation within gear preventing adjustments of the inner registers for flame stability. See photos 16 and 17. The spin vane and outer burner sleeve area also indicates ash and slag accumulation in several of the burners which prevents spin vane movement plus, it also disrupts the air flow distribution around the inner zone of the flame.

**MECHANICAL STOPS** - Mechanical stops were added on a trial basis to some of the outer register linkage assemblies to limit their range of motion.

**BURNER THERMOCOUPLES** - All bad burner thermocouples were repaired or replaced and were also verified during the outage to insure operability.

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BURNER TO WATERWALL SEAL - The burner to waterwall seal is in need of refurbishing. Seal strips need to be reattached and rope packing inserted to provide an air tight seal against the boiler frontwall.

OUTER REGISTER ASSEMBLY THERMAL EXPANSION - Design changes have previously been made to only some of the upper burner levels to allow thermal expansion without breaking structural welds or warping materials. Weld cracking is still occurring on those burners not modified. All burners not having this modification need to be upgraded to prevent structural problems from occurring.

BURNER OVERHEATING - Inspection revealed evidence of some overheating still occurring to the burners. Outer register assembly backplate supports on the HD series modifications show signs of overheat due to discoloration of the stainless steel material. Permanent warpage and bowing is still occurring on the original backplates and broken welds are also evident. NOTE: The coal nozzle tip modification cannot be inspected to determine if the material upgrade is functioning satisfactorily (alloy nipple tip extends up into burner sleeve beyond visual capabilities).

FLYASH ACCUMULATION - Accumulation of flyash has been occurring in the bottom of the windboxes on burner levels one and three. Depths are up to twelve (12) inches and require vacuuming on every outage. Investigation needs to be made as to the source, to prevent possible overloading of the windbox structural casing which separates burner levels.

WINDBOX DAMPERS - IPSC Instrument & Control and B&W stroked all windbox secondary air dampers to confirm movement, full range of motion and proper cold clearances.

COAL ON BURNERS - Coal dust, exterior to the windbox settled on the burners, lighters, scanner, etc., pose a fire hazard if not properly removed after each substantial occurrence.

#### RECOMMENDATIONS

DRIVE HANDLES/SLIP JOINTS ON OUTER REGISTERS (48 TOTAL) - Straighten or replace all bent drive handle rods to the outer registers. Modify each drive handle assembly with a slip joint to allow for thermal growth (drive rod is fixed at both the burner front and at the burner itself).

DRIVE HANDLES/SLIP JOINTS ON SPIN VANES - Straighten or replace all bent drive handle rods on the inner registers. Modify each drive handle with a slip joint assembly to allow for thermal growth of the burner.

SPIN VANES/INNER REGISTER ASSEMBLIES - Sand blast all gear assemblies to remove flyash buildup. Stroke spin vanes to verify full range of movement. Trim spin vanes around lighter shrouds and scanner tubes, if obstructing movement. Lubricate all linkages with penetrating oil.

OUTER SLEEVE/SPIN VANES - Clean out any ash or slag deposits around spin vanes in the outer burner sleeve. Investigate increasing sweep times or secondary air flow rates during pulverizer shutdown and start-up to prevent fallout or lickback.

HD OUTER REGISTERS - Modify all outer register assemblies so they are identical with one another. Remove existing HD's or upgrade all burners to HD outer registers modifications.

BURNER TO WATERWALL ROPE PACKING SEAL - Refurbish leaf seal and reinsert rope packing to provide tight seal against air and ash infiltration.

OUTER REGISTER ASSEMBLY, THERMAL EXPANSION MODIFICATION - Modify all outer register assemblies not previously upgraded, to allow for thermal growth of the outer register to prevent burner structural problems.

BURNER OVERHEATING - Investigate lowering stainless steel burner front metal temperature alarm set points from 1300° F to 1200° F by increasing the minimum cooling air flow requirements to out of service burners.

FLYASH ACCUMULATION IN WINDBOX - Flyash needs to be vacuumed out of the windboxes on every outage. Investigate cause of problem and eliminate source.

THERMOCOUPLE UPGRADE ON BURNERS - Investigate upgrading two (2) thermocouples per burner on all burners. Attach thermocouples to the backplate and on the coal nozzle tip to monitor adequate cooling temperatures and for the deflection of burner line fires. Currently, every other burner is being monitored.

REGISTER DRIVE HANDLES - Replace all hexagon lockscrews on both inner and outer register drive handles (96 total). Most are either stripped, missing, immobile, filled with flyash or other debris and need to be replaced to permit adjustability.